

# PATENT ABSTRACTS OF JAPAN

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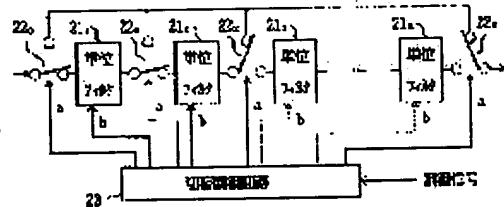
(22)Date of filing : 27.04.1992 (72)Inventor : OSADA HIDEFUMI

## (54) RECEIVER

### (57)Abstract:

**PURPOSE:** To effectively suppress interference waves with the minimum power consumption by successively selecting the minimum number of cascade connections within a range where detected interference amount does not exceed a prescribed value and inhibiting the supply of electric power to unused unit filters.

**CONSTITUTION:** In the constitution of a band-pass filter, changeover switches 220-22n are provided between and both the ends of respective unit filters 211-21n. A switching control circuit 23 decides the number of the cascade connections of the unit filters 211-21n by a control signal from an interference amount detector and outputs a switching control signal (a) for switching the corresponding switch to the unit filter side. Further, a voltage control signal (b) is outputted to supply the operating electric power only to the unit filters to be cascade connected. Thus, the unit filters 211 and 212 are cascade connected when selectively obtained by the unit filters of two steps from the interference amount detected at the interference detector is sufficient. Consequently, the power consumption at the unit filters 213-21n can be saved and the power consumption of the entire band-pass filter can be suppressed at the irreducible minimum.



**LEGAL STATUS**

[Date of request for examination]

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[Date of final disposal for application]

[Patent number]

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## DESCRIPTION OF DRAWINGS

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**[Brief Description of the Drawings]**

Drawing 1 The block diagram showing the example configuration of the receiver of invention according to claim 1.  
Drawing 2 The block diagram showing the example of a configuration of a band limit filter.  
Drawing 3 The block diagram showing the example configuration of the receiver of invention according to claim 2.  
Drawing 4 Drawing showing the selectivity property set up with a band limit filter.  
Drawing 5 The block diagram showing the example of a configuration of the conventional direct conversion mold receiver.

**[Description of Notations]**

11 Band Limit Filter  
12 The Amount Detector of Interference  
21 Unit Filter  
22 Switch  
23 Change Control Circuit  
31 Receiving Level Detector  
50 Antenna  
51 Band-pass Filter (BPF)  
52 High-frequency Amplifier (RFAMP)  
53 Inphase Distributor (HYB)  
54 Frequency Converter  
55 Local Oscillator  
56 Phase Shifter  
57 Band Limit Filter  
58 Amplitude Limiter  
59 Wave Detector

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## \* NOTICES \*

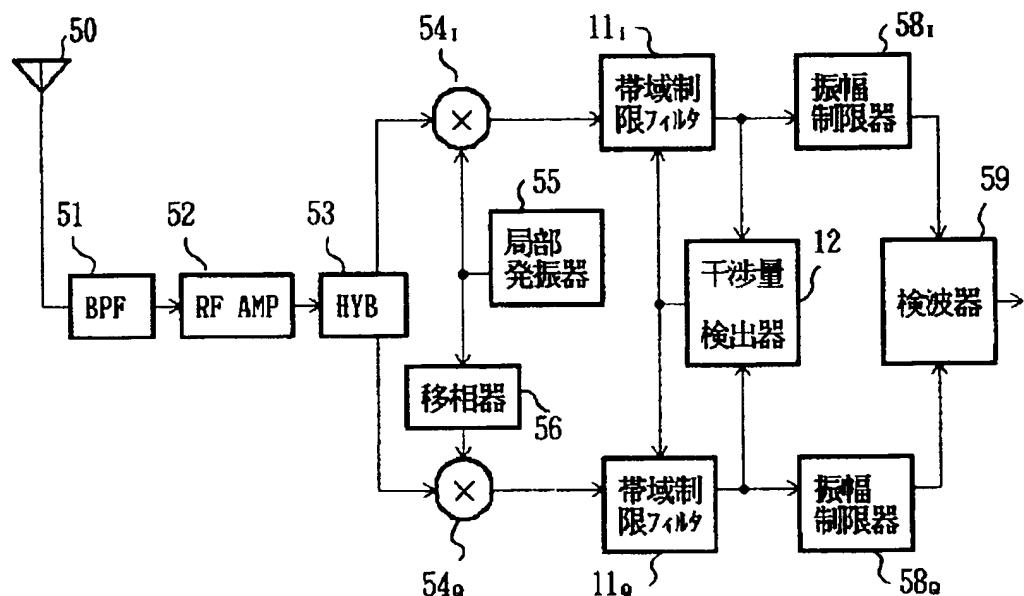
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## DRAWINGS

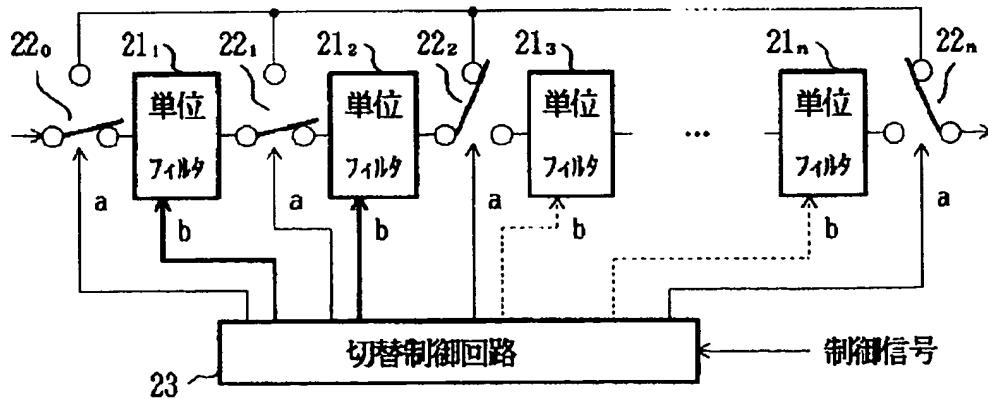
## [Drawing 1]

請求項 1 に記載の受信機の実施例構成



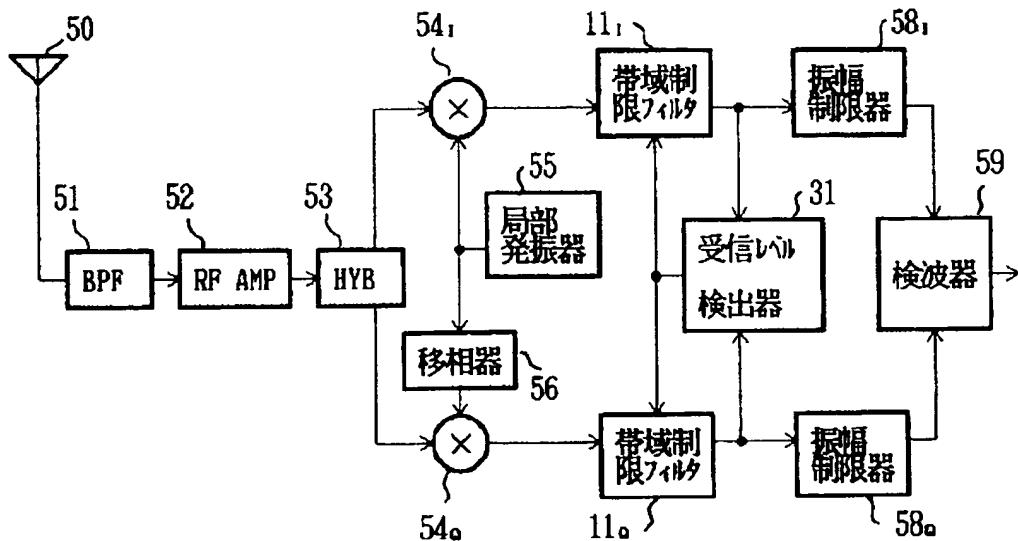
## [Drawing 2]

帯域制限フィルタ 11 の構成例



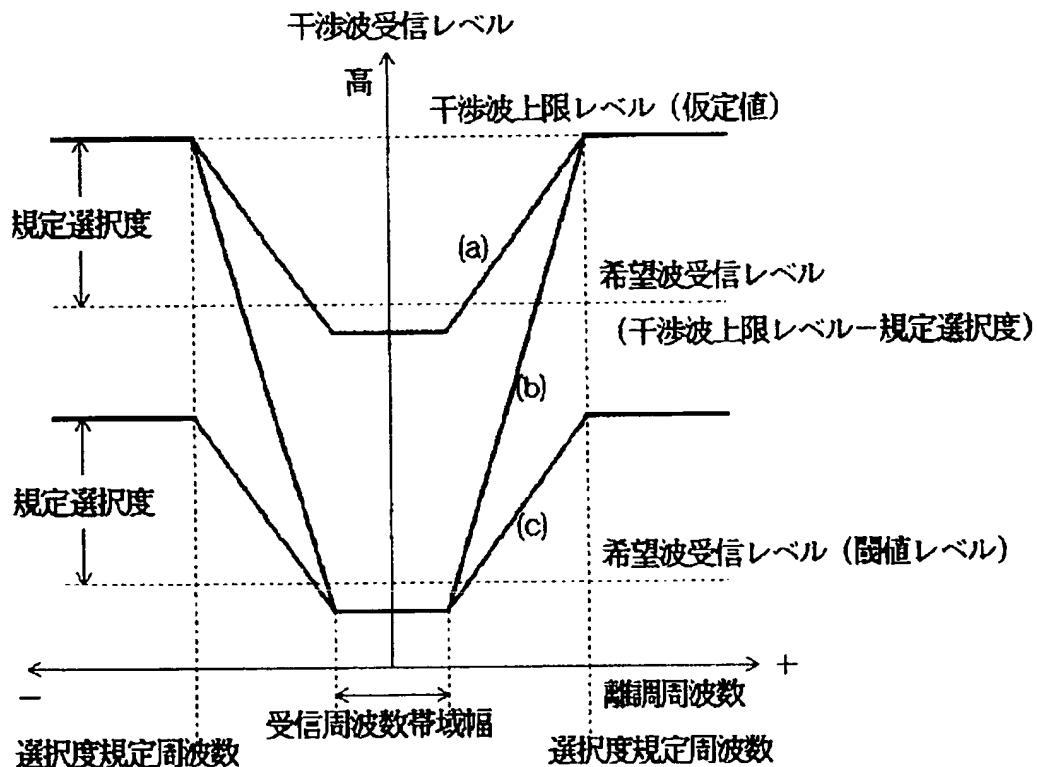
## [Drawing 3]

## 請求項 2 に記載の受信機の実施例構成



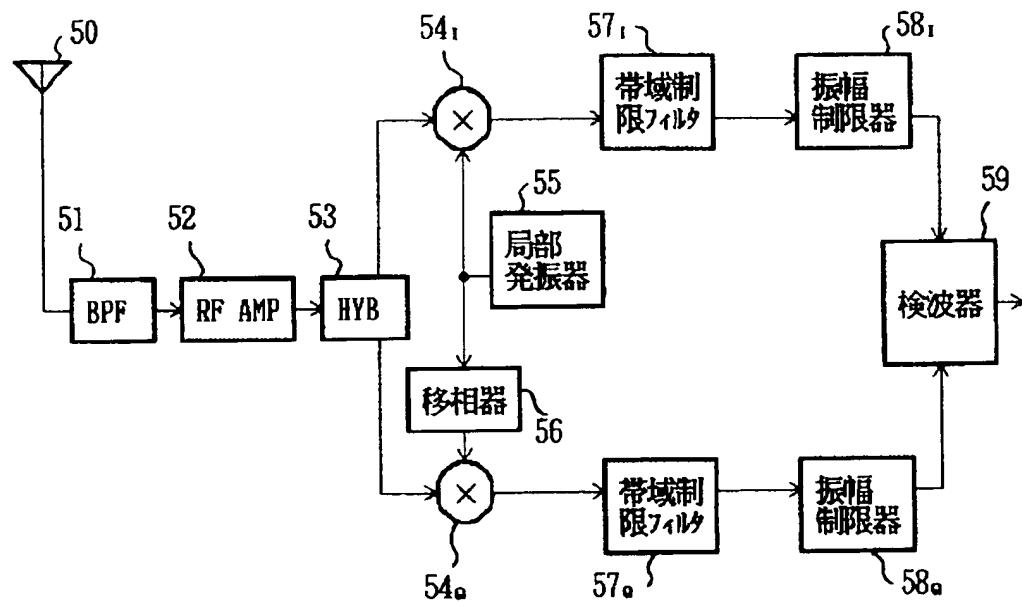
[Drawing 4]

帯域制限フィルタで設定される選択度特性



[Drawing 5]

## 従来の直接変換型受信機の構成例



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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the receiver which has a selectivity property for an interference wave to fully oppress an interference wave in the receiver used for the mobile communication under the propagation situation existing [ many ].

[0002]

[Description of the Prior Art] Drawing 5 is the block diagram showing the example of a configuration of the conventional direct conversion mold receiver. in drawing, need signalling frequency is amplified through a band-pass filter (BPF) 51 and the high-frequency amplifier (RFAMP) 52, and 2 \*\*\*\*'s of the received waves received by the antenna 50 are carried out with the inphase distributor (HYB) 53 -- having -- respectively -- frequency-converter 54I -- it is inputted into 54Q. Frequency-converter 54I and 54Q The frequency-conversion signal of I channels and Q channels is outputted using two local oscillation signals which are generated with a local oscillator 55 and a phase shifter 56 and which have pi/2 of phase contrast mutually. Each frequency-conversion signal is band limit filter 57I and 57Q, respectively. And amplitude limiter 58I and 58Q It minds, and it is inputted into a wave detector 59 and gets over.

[0003] Here, they are band limit filter 57I and 57Q. The selectivity of a receiver is determined, and an interference wave can be oppressed if selectivity is raised.

[0004]

[Problem(s) to be Solved by the Invention] By the way, band limit filter 57I used for the conventional direct conversion mold receiver and 57Q The selectivity set up since electrical characteristics are immobilization had also been fixed. Therefore, oppression effectiveness sufficient in the environment where the level of an interference wave is changed sharply could not be acquired, but it had become the factor which degrades communication link quality.

[0005] On the other hand, in order to fully oppress an interference wave and to raise selectivity, it is known that what is necessary is just to use the band limit filter of a narrow-band. However, in order to acquire a narrow-band property, the number of stages of a filter will have to be made [ many ], and the configuration of a band limit filter will become large. In addition, although it has come to be able to make a configuration small by adoption of an active filter, it is not avoided that power consumption becomes large according to a number of stages.

[0006] This invention aims at offering the receiver which can stop the power consumption of a band limit filter which sets up the selectivity while sufficient selectivity which can oppress an interference wave is obtained.

[0007]

[Means for Solving the Problem] In the receiver of the direct conversion mold with which invention according to claim 1 was equipped with at least one step of frequency converter, the band limit filter, and the wave detector a band limit filter Have two or more unit filters and the unit filter of the number according to a control signal is connected to concatenation. And it is the configuration which supplies operating power only to the unit filter by which cascade connection is carried out. It asks for the selectivity which an interference wave component is detected from the output of a band limit filter, and the amount of interference becomes below a predetermined value, and the selectivity control means which generates the control signal which gives the number of cascade connection of the unit filter according to the selectivity is had and constituted.

[0008] In the receiver of the direct conversion mold with which invention according to claim 2 was equipped with at least one step of frequency converter, the band limit filter, and the wave detector a band limit filter Have two or more unit filters and the unit filter of the number according to a control signal is connected to concatenation. And it is the configuration which supplies operating power only to the unit filter by which cascade connection is carried out. The

wave level of choice is detected from the output of a band limit filter, when the level falls, the control signal to which the number of cascade connection of a unit filter is made to increase is generated, and when a disregard level rises, the selectivity control means which generates the control signal which decreases the number of cascade connection of a unit filter is had and constituted.

[0009]

[Function] In case invention according to claim 1 carries out cascade connection of the one or more unit filters and constitutes one band limit filter, it can obtain the optimal selectivity which can oppress an interference wave by choosing the number of cascade connection of successive minima in the range in which the amount of interference detected does not exceed a predetermined value. Furthermore, unnecessary power consumption is reducible by making it not supply operating power to the unit filter which is not then used. That is, an interference wave can be effectively oppressed by the minimum power consumption by making a filter number of stages adjustable and optimizing selectivity.

[0010] Invention according to claim 2 can obtain sufficient selectivity which oppresses an interference wave by making the sequential selection of the number of cascade connection of a unit filter according to the wave level of choice. Furthermore, unnecessary power consumption is reducible similarly by making it not supply operating power to the unit filter which is not then used. That is, an interference wave can be effectively oppressed by the minimum power consumption by making a filter number of stages adjustable and optimizing selectivity.

[0011]

[Example] Drawing 1 is the block diagram showing the example configuration of the receiver of invention according to claim 1.

[0012] drawing -- setting -- an antenna 50, a band-pass filter (BPF) 51, the high-frequency amplifier (RFAMP) 52, the inphase distributor (HYB) 53, and frequency-converter 54I -- 54Q, a local oscillator 55, a phase shifter 56, amplitude limiter 58I, and 58Q And the wave detector 59 is the same as that of the example of a configuration of the conventional direct conversion mold receiver shown in drawing 5.

[0013] The place by which it is characterized [ of this example ] is frequency-converter 54I and 54Q. Amplitude limiter 58I and 58Q In between Band limit filter 11I which has two or more unit filters, and connects the unit filter of the number according to a control signal to concatenation, and supplies operating power only to those unit filters, and 11Q It arranges. It responds to the amount of interference detected from the output, and they are band limit filter 11I and 11Q. It is in the configuration which formed the amount detector 12 of interference which generates the control signal which gives the number of cascade connection of a unit filter.

[0014] Here, the example of a configuration of a band-pass filter 11 is shown in drawing 2 . It sets to drawing 2 and is 211-21n of each unit filter. 220-22n of switches which change whether it connects with the following unit filter, respectively, or it bypasses to between and its both ends It is prepared. The change control circuit 23 outputs the change control signal a which judges the number of cascade connection of a unit filter with the control signal given from the amount detector 12 of interference, and changes a corresponding switch to a unit filter side. Furthermore, the armature-voltage control signal b for supplying operating power is outputted only to the unit filter by which cascade connection is carried out.

[0015] When the amount detector 12 of interference has the large amount of interference, the control signal which shows the number of cascade connection of the unit filter for obtaining sufficient selectivity oppressing the interference wave is outputted, and the change control circuit 23 starts the unit filter of a large number according to it, makes attenuation slope of a band limit filter steep, and attains required selectivity. Moreover, when the amount of interference is small, the control signal which shows the number of cascade connection of a unit filter similarly is outputted, and the change control circuit 23 starts a small number of unit filter according to it, makes attenuation slope of a band limit filter slow, and attains required selectivity.

[0016] In addition, drawing 2 is two unit filters 211 and 212, when the selectivity obtained from the amount of interference detected with the amount detector 12 of interference with two steps of unit filters is enough. The condition of having carried out cascade connection is shown. 213-21n of therefore, unit filters The power consumption which can be set can be reduced and the power consumption of the whole band limit filter can be held down to necessary minimum.

[0017] Drawing 3 is the block diagram showing the example configuration of the receiver of invention according to claim 2. drawing -- setting -- an antenna 50, a band-pass filter (BPF) 51, the high-frequency amplifier (RFAMP) 52, the inphase distributor (HYB) 53, and frequency-converter 54I -- 54Q, a local oscillator 55, a phase shifter 56, amplitude limiter 58I, and 58Q And the wave detector 59 is the same as that of the example of a configuration of the conventional direct conversion mold receiver shown in drawing 5 . Moreover, band limit filter 11I and 11Q It is the same as that of

the example configuration shown in drawing 1 - drawing 2 .

[0018] The place by which it is characterized [ of this example ] is band limit filter 11I and 11Q. It is in the configuration which formed the receiving level detector 31 which generates the control signal which sets up the number of cascade connection of a unit filter according to the wave level of choice detected from an output.

[0019] Here, the selectivity property set up with a band limit filter is shown in drawing 4 . (a) is the conventional selectivity property (at the time of the wave reception wishing high electric field), (b) is the maximum selectivity property in this example, (c) shows the conventional selectivity property (at the time of the wave reception wishing low electric field). selectivity property (a) as shown in drawing, in case the conventional selectivity property is immobilization and the wave of choice is a high level Selectivity property at the time of being a low (b) It is equal. An interference wave is (c), when it follows, for example, the wave level of choice is threshold level. When reached more than level, an interference wave was not fully able to be oppressed.

[0020] therefore, a selectivity property in case the wave level of choice is threshold level in this example -- (b) \*\* -- carrying out -- the rise of the wave level of choice -- following -- a selectivity property -- (b) a selectivity property in case it is made become slow compared with attenuation slope and the wave level of choice is (interference wave upper limit level (assumption value)-convention selectivity) -- (a) \*\* -- sufficient selectivity which oppresses an interference wave can be obtained by carrying out. However, it is not taking into consideration about desensitization here.

[0021] Then, when the receiving level detector 31 detects the wave level of choice and it is falling, in order to raise selectivity, the change control circuit 23 starts many unit filters, and makes attenuation slope of a band limit filter steep. For example, it is (b) from (c) about a selectivity property in case the wave level of choice is threshold level. It is made like. Consequently, it compares with the former and is (c). (b) Effect of an interference wave can be influenced and carried out in the range across which it faced.

[0022] Moreover, when the wave level of choice is rising, in order to lower selectivity, the change control circuit 23 starts a small number of unit filter according to it, and makes attenuation slope of a band limit filter slow. For example, (a) It sets up like.

[0023] In addition, unnecessary power consumption is reducible similarly by making it not supply operating power to the unit filter which became unnecessary with modification of selectivity.

[0024]

[Effect of the Invention] As explained above, under the propagation situation that many interference waves exist, the selectivity property of a receiver can be optimized, and this invention can ease a selectivity property, when there are few interference waves, and can reduce power consumption. That is, since an interference wave can be effectively oppressed by the minimum power consumption, when it uses as a receiver for mobile communication, a time can be extended to the maximum extent, keeping communication link quality good.

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## CLAIMS

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## [Claim(s)]

[Claim 1] At least one step of frequency converter which performs frequency conversion of an input signal using a predetermined local oscillation signal, In the receiver of the direct conversion mold equipped with the band limit filter which band-limits the signal by which frequency conversion was carried out with said frequency converter, and oppresses an interference wave component, and the wave detector which detects the signal band-limited with said band limit filter Said band limit filter has two or more unit filters, and connects the unit filter of the number according to a control signal to concatenation. And it is the configuration which supplies operating power only to the unit filter by which cascade connection is carried out. The receiver characterized by having the selectivity control means which generates said control signal which asks for the selectivity which an interference wave component is detected from the output of said band limit filter, and the amount of interference becomes below a predetermined value, and gives the number of cascade connection of the unit filter according to the selectivity.

[Claim 2] At least one step of frequency converter which performs frequency conversion of an input signal using a predetermined local oscillation signal, In the receiver of the direct conversion mold equipped with the band limit filter which band-limits the signal by which frequency conversion was carried out with said frequency converter, and oppresses an interference wave component, and the wave detector which detects the signal band-limited with said band limit filter Said band limit filter has two or more unit filters, and connects the unit filter of the number according to a control signal to concatenation. And it is the configuration which supplies operating power only to the unit filter by which cascade connection is carried out. Said control signal to which the number of cascade connection of a unit filter is made to increase when the wave level of choice is detected from the output of said band limit filter and the level falls is generated. The receiver characterized by having the selectivity control means which generates said control signal which decreases the number of cascade connection of a unit filter when a disregard level rises.

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[Translation done.]